CLAIMS

What is claimed is:

1. An anti-viral agent comprising a ligand that targets RNase H RNA-DNA hybrid substrates of RT, wherein the ligand inhibits the RNase H activity of RT.

2. A method for inhibiting reverse transcriptase comprising the step of:

targeting RNA-DNA hybrid substrates of the RNase H activity of RT, wherein the anti-viral agent of claim 1 targets and binds to the RNA-DNA hybrid substrates, thereby inhibiting the RNase H activity of reverse transcriptase.

3. The method of claim 2, wherein the anti-viral agent is an aminoglycoside.

4. The method of claim 3, wherein the aminoglycoside is selected from a group consisting of neomycin, kanamycin, paromomycin, tobramycin and ribostamycin.

5. The method of claim 2, wherein the anti-viral agent is neomycin.

6. The method of claim 5, wherein the neomycin to RNA-DNA hybrid substrate ratio is 1:1.

7. The method of claim 6, wherein the neomycin inhibits reverse transcriptase induced cleavage of the substrate by 80% at the primary site.

8. The method of claim 5, wherein the neomycin to RNA-DNA hybrid substrate ratio is 5:1.

9. The method of claim 8, wherein the neomycin completely inhibits reverse transcriptase induced cleavage of the substrate at the primary site.

10. An anti-HIV-1 agent comprising an aminoglycoside that targets RNase H RNA-DNA hybrid substrates of reverse transcriptase, wherein the aminoglycoside prevents the reverse transcriptase from cleaving the HIV-1 RNA, thereby inhibiting replication of HIV-1.

11. A method for inhibiting HIV-1 reverse transcriptase comprising the step of:

targeting RNase H RNA-DNA hybrid substrate of RT, wherein the anti-HIV-1 agent of claim 10 targets and binds to the RNA-DNA hybrid substrate at the location of RNase H activity, thereby inhibiting viral replication of HIV-1.

12. The method of claim 11, wherein the anti-HIV–1 agent is an aminoglycoside selected from a group consisting of neomycin, kanamycin, paromomycin, tobramycin and ribostamycin.

13. A method for screening potential anti-viral agents that inhibit RT activity by targeting RNase RNA-DNA substrates of RT comprising the steps of:

(a) mixing a potential anti-viral agent with a specific RNase RNA-DNA hybrid substrate,

(b) adding RT to the mixture in step (a),

(c) resolving the cleavage product of RT, and

(d) analyzing the effect of the potential anti-viral agent on the RNase activity of RT.

14. A high throughput screening method for identifying anti-viral agents that inhibit the RNase activity of RT by targeting RNase RNA-DNA hybrid substrates comprising the steps of:

(a) selecting a group of potential anti-viral agents,

(b) introducing each potential anti-viral agents from the group to a reaction mixture containing labeled target RNase RNA-DNA hybrid substrate,

(c) introducing RT to each mixture in step (b),

(d) resolving the cleavage products of RT for each mixture in step (c), and

(e) analyzing each potential anti-viral agent for its ability to inhibit the RNase activity of RT.

15. A kit for screening potential anti-viral agents that target RNase RNA-DNA hybrid substrates comprising:

(a) a reaction mixture containing a labeled target RNase RNA-DNA hybrid substrate,

(b) reverse transcriptase, and

(c) instructions for use.

16. The kit of claim 15, further comprising a mixture to stop the cleavage reaction of RT.

17. The kit of claim 16, further comprising a mixture for denaturing the RNA-DNA hybrid substrate.